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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SUCHFIELD, GEORGE A

ART UNIT

PAPER NUMBER

3672

DATE MAILED: 01/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/841,284

Applicant(s)

VINEGAR ET AL.

Examiner

George Suchfield

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 November 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2193-2269, 5081-5090 and 5150-5222 is/are pending in the application.
- 4a) Of the above claim(s) 2197, 2198, 2236 and 2237 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2193-2196, 2199-2235, 2238-2269, 5081-5090 and 5150-5222 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 2193-2269, 5081-5090 and 5150-5222 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 November 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 18, 19. 6) ☐ Other: _____

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1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 2193-2196, 2199-2235, 2238-2269, 5081-5090, and 5150-5222 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 2193, 2232, 5081, 5150, 5175 are deemed indefinite in that, in each claim, it is not clear whether the "one or more heaters" in line 3 refer to the "one or more heaters" in line 2, or are in addition thereto. This rejection could be overcome if the recitation in line 3 were amended to read -- the one or more heaters -- .

Claims 5202, 5203, 5206, 5207, 5210, 5211, 5215, 5216, 5220 and 5221 are deemed incomplete and therefore indefinite insofar as there is no step of initially establishing "a pyrolysis zone", as called for in lines 1 and 2 of the claims. This rejection could be overcome, however, by, e.g., amending lines 1 and 2 of these claims to read -- wherein a pyrolysis zone is established in the part of the formation --.

3. Conflicts exist between claims of the following related ninety-one co-pending applications which includes the present application:

09/840,936; 09/840,937; 09/841,000; 09/841,060; 09/841,061; 09/841,127; 09/841,128; 09/841,129; 09/841,130; 09/841,131; 09/841,170; 09/841,193; 09/841,194; 09/841,195; 09/841,238; 09/841,239; 09/841,240; 09/841,283; 09/841,284; 09/841,285; 09/841,286; 09/841,287; 09/841,288; 09/841,289; 09/841,290; 09/841,291; 09/841,292; 09/841,293; 09/841,294; 09/841,295; 09/841,296; 09/841,297; 09/841,298; 09/841,299; 09/841,300; 09/841,301; 09/841,302; 09/841,303; 09/841,304; 09/841,305; 09/841,306; 09/841,307; 09/841,308; 09/841,309; 09/841,310; 09/841,311; 09/841,312; 09/841,429; 09/841,430; 09/841,431; 09/841,432; 09/841,433; 09/841,434; 09/841,435; 09/841,436; 09/841,437; 09/841,438; 09/841,439; 09/841,440; 09/841,441; 09/841,442; 09/841,443; 09/841,444; 09/841,445; 09/841,446; 09/841,447; 09/841,448; 09/841,449; 09/841,488; 09/841,489; 09/841,490; 09/841,491; 09/841,492; 09/841,493; 09/841,494; 09/841,495; 09/841,496;

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09/841,497; 09/841,498; 09/841,499; 09/841,500; 09/841,501; 09/841,502; 09/841,632; 09/841,633; 09/841,634; 09/841,635; 09/841,636; 09/841,637; 09/841,638; and 09/841,639.

37 CFR 1.78(b) provides that when two or more applications filed by the same applicant contain conflicting claims, elimination of such claims from all but one application may be required in the absence of good and sufficient reason for their retention during pendency in more than one application. The discussion below sets forth the Office's basis for its determination that each of these ninety-one applications contains at least one claim that conflicts with another one of the related co-pending applications identified above. Each of these ninety-one applications includes the same specification and collectively these applications present over five thousand claims. The Office has shown that each of these ninety-one applications contains at least one claim that conflicts with another one of the related co-pending applications identified above, and an analysis of each of five thousand+ claims in the ninety-one related co-pending applications would be an extreme burden on the Office requiring tens of thousands of claim comparisons. Therefore, the Office is requiring applicant to resolve the conflict between these applications and comply with 37 CFR 1.78(b) by either:

- (1) filing a terminal disclaimer in each of the related ninety-one applications terminally disclaiming each of the other twenty-eight applications; or,
- (2) provide a statement that all claims in the ninety-one applications have been reviewed by applicant and that no conflicting claims exist between the applications. Such a statement must set forth factual information identify how all the claims in the instant application are distinct and separate inventions from all the claims in the above identified ninety-one applications.

Applicant is reminded that obviousness-type double patenting analysis entails a two-step process: (1) the claims of this application and the other ninety-one applications must be construed; and (2) the claims of this application must be compared with the claims of the other applications to determine whether the differences in subject matter between the two claims render the claims patentably distinct. See Georgia-Pacific Corp. v. United States Gypsum Co., 195 F.3d 1322, 1326, 52 USPQ2d 1590, 1593 (Fed. Cir. 1999), and General Foods Corp. v. Studiengesellschaft Kohle, 972 F.2d 1272, 1279, 23 USPQ2d 1839, 1844 (Fed. Cir. 1992). As the Court of Customs and Patent Appeals (CCPA) explained: "[t]he fundamental reason for the rule [against "double patenting"] is to prevent unjustified timewise extension of the right to exclude granted by a patent no matter how the extension is brought about." In re Van Ornum, 686 F.2d 937, 943-44, 214 USPQ 761, 766 (CCPA 1982) (brackets and emphasis in the original) (quoting In re Schneller, 397 F.2d 350, 354, 158 USPQ 210, 214 (CCPA 1968)). Furthermore, the requirement will be held in abeyance until such time as the examiner indicates allowable subject matter. Examples of conflicts appear in the rejections here-in-below.

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible

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harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321© may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

5. Claims 2193-2269, 5081-5090 and 5150-5222 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending applications (including the present application):

09/840,936; 09/840,937; 09/841,000; 09/841,060; 09/841,061; 09/841,127; 09/841,128; 09/841,129; 09/841,130; 09/841,131; 09/841,170; 09/841,193; 09/841,194; 09/841,195; 09/841,238; 09/841,239; 09/841,240; 09/841,283; 09/841,284; 09/841,285; 09/841,286; 09/841,287; 09/841,288; 09/841,289; 09/841,290; 09/841,291; 09/841,292; 09/841,293; 09/841,294; 09/841,295; 09/841,296; 09/841,297; 09/841,298; 09/841,299; 09/841,300; 09/841,301; 09/841,302; 09/841,303; 09/841,304; 09/841,305; 09/841,306; 09/841,307; 09/841,308; 09/841,309; 09/841,310; 09/841,311; 09/841,312; 09/841,429; 09/841,430; 09/841,431; 09/841,432; 09/841,433; 09/841,434; 09/841,435; 09/841,436; 09/841,437; 09/841,438; 09/841,439; 09/841,440; 09/841,441; 09/841,442; 09/841,443; 09/841,444; 09/841,445; 09/841,446; 09/841,447; 09/841,448; 09/841,449; 09/841,488; 09/841,489; 09/841,490; 09/841,491; 09/841,492; 09/841,493; 09/841,494; 09/841,495; 09/841,496; 09/841,497; 09/841,498; 09/841,499; 09/841,500; 09/841,501; 09/841,502; 09/841,632; 09/841,633; 09/841,634; 09/841,635; 09/841,636; 09/841,637; 09/841,638; and 09/841,639.

Although the conflicting claims are not identical, they are not patentably distinct from other. For example; claim 564, currently pending in S.N. 09/841,430 is an obvious variation of claim 2200 pending herein, and claim 565 currently pending in 09/841,430 is an obvious

variation of claim 2239 pending herein. More specifically, both claim 564 and 2200 call for heating a section of a formation to increase the permeability to greater than about 100 millidarcy while controlling the pressure as a function of temperature, or controlling the temperature as a function of pressure; the precise extent of formation heated, i.e., a majority of the section or a majority of a portion of the section is deemed a matter of choice or design based on, e.g., formation characteristics or economic feasibility. Similarly, both claim 565 and 2239 call for heating a section of a formation to increase the permeability substantially uniformly while controlling the pressure as a function of temperature, or controlling the temperature as a function of pressure; the precise extent of formation heated, i.e., a majority of the section or a majority of a portion of the section is deemed a matter of choice or design based on, e.g., formation characteristics or economic feasibility.

It is further noted that claims 2193-2269, 5081-5090 and 5250-5222 are specifically not patentably distinct from claims 2193-2269 and 5317-5327 of applicant's copending application 09/841,000 because the coal formation treated by the method of, e.g., claim 2193 or 5081 of this pending application is deemed broad enough to encompass the hydrocarbon formation of claim 2193 or 5317 of the copending application. Otherwise, the remaining claims of both this and the copending application appear to correspond.

See MPEP 804.02 IV for a discussion of multiple double patenting rejections and the requirements for a single terminal disclaimer.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

6. Claims 2193-2196, 2200, 2203, 2205-2215, 2217, 2218, 2226, 2227, 2232-2235, 2239, 2242, 2244-2254, 2256, 2257, 2265, 5081-5085, 5175-5178, 5180, 5182-5190, 5192, 5196,

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5201-5217 and 5219-5222 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ljungstrom (2,923,535).

Ljungstrom discloses a process for heating a coal formation wherein the heat imparted causes volatilization, pyrolysis and gasification of hydrocarbon constituents, as well as causing an increase in permeability of such coal formation (note col. 2, lines 1-24), as called for in claim 5081. It is further deemed that such permeability increase will inherently or obviously be substantially uniform, as called for in claims 2232, 2227, 5196, e.g. during an overall field heating process, as illustrated in Figures 2-5. Such permeability increase is deemed to necessarily or inherently encompass an increase to “greater than about 100 millidarcy” or “greater than about 5 Darcy”, as called for in claims 2193, 2226, 2265, 5175; alternatively, to increase the permeability to greater than 100 millidarcy or 5 Darcy would have been an obvious matter of choice in order to ensure adequate fluid flow through the formation.

With further regard to claim 5081, noted above, it is deemed that Ljungstrom (col. 2, lines 1-24) discloses that the coal formation may be “relatively impermeable”; thus it is deemed that such coal formation will inherently or obviously possess an initial permeability of less than 10 millidarcy, depending on the particular formation or field encountered. Alternatively, to choose a coal deposit of such low permeability would have been an obvious matter of choice or design, especially since the process does not require the initial injection of fluid directly into or through the formation.

As per claim 2194, 2233, 5082, 5196, in view of the large number of heat input wellbores or “sources”, relative to a recovery wellbore (26), as illustrated in Figures 2-5 and 9, it is deemed at least some overlap or “superposition” of the heat applied will necessarily or obviously occur,

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especially in ensuring that the entire coal formation extent is heated – which appears necessary in order to provide the “exhaust channels” (40,42) in the coal seam (col. 3, line 48 – col. 4, line 9)

As noted above, pyrolysis clearly occurs in the coal formation, as called for in claims 2195, 2234, 5177, 5202, 5203, 5206, 5207, 5210, 5211, 5215, 5216, 5220 and 5221.

As per claims 2200, 2239, 5178, Ljungstrom specifically discloses that the temperature “may be controlled depending on ... the pressure maintained or permitted to build up” (col. 2, lines 41-45). In addition, the temperature and pressure curves of Figures 10 and 11 appear to indicate a direct relationship between temperature and pressure within the coal formation.

As per claim 2203, 2242, 5180, at least a portion of the heating effected in Ljungstrom is effected “substantially by conduction”, e.g., in the widening of the porous coal layer (30) (see col. 3, lines 29-36).

Regarding claims 2205-2215, 2217, 2218, 2244-2254, 2256, 2257, 5175, 5182-5190, 5192, it is deemed that the myriad hydrocarbon product mixtures recited in these claims would necessarily or obviously occur in carrying out the heating process of Ljungstrom, i.e., the precise composition of the product fluids is seen as dictated by the type of coal naturally occurring in the particular coal formation actually encountered in the field. Moreover, it would be an obvious matter of choice to operate the Ljungstrom process to minimize what would be considered refinery contaminants, such as sulfur, nitrogen and/or oxygen in the product mixtures. Similarly, it would be obvious to reduce or minimize the amount of asphaltenes in the product mixtures for optimum downstream refining. Also, in the event that the particular coal deposit encountered yields ammonia gas, it would be an obvious expedient to utilize it in a commercial process such as fertilizer production.

As per claim 5083, since coal, per se, may exist in myriad forms varying in structural, mineral and hydrocarbon content, it is deemed that during the heating of the coal formation in Ljungstrom, i.e., by electrical heating and/or in situ combustion, some “thermal fracturing” of the coal formation may occur, depending the particular coal formation actually encountered in the field.

As per claim 5084, the recited temperature range of 270oC – 400oC is deemed to encompass the exemplary temperature range in Ljungstrom (col. 2, lines 25-42) of 100oC – 250oC for the electrical heating phase, followed by 300oF – 400oC with any difference therebetween deemed an obvious matter of choice or design based on, e.g., the characteristics or type of the particular coal formation encountered in the field.

As per claims 2196, 2235 and 5085, note the use of electrical heating elements (22) in Ljungstrom.

7. Claims 2202, 2204, 2222, 2228, 2229, 2241, 2243, 2261, 2266, 2267, 5181, 5193, 5195, 5197, 5198, 5199, 5200 and 5218 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535).

The precise heating rate and/or thermal conductivity recited in claims 2201, 2202, 2240, 2241, 5179, are deemed obvious matters of choice or design, especially in carrying out the embodiment in Ljungstrom of controlling and/or maintaining the temperature in the coal formation within a specific operating range (col. 2, lines 25-48)

The thermal conductivity recited in claim 2204, 2243, 5181 is deemed an obvious matter of choice or design based on, e.g., the quality and type of the coal formation present and/or the matrix characteristics of the particular coal formation encountered in the field.

The steps of 2222, 2228, 2261, 2266, 5193, 5195, 5197 such as controlling the heat or pressure in the formation, are deemed obvious matters of choice or design in carrying out the process of Ljungstrom, consistent with one of the overall objectives of Ljungstrom to control the heating process (col. 2, lines 25-55).

Regarding claims 2229, 2267, 5198-5200 and 5218, Ljungstrom in the embodiment of Figures 2-5 and 9, discloses that myriad heating wellbores (20) may surround a production wellbore or shaft (26). The precise number of such heating wells provided, as called for in these claims, is deemed an obvious matter of choice or design in carrying out the process of Ljungstrom based on, e.g., the overall areal extent of the coal formation(s) encountered in exploiting an actual reservoir encountered in the field.

8. Claims 2216, 2220, 2221, 2255, 2259, 2260, 5150-5170, 5172-5174, 5191, 5194 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claim 2193 above, and further in view of Tsai et al (4,299,285).

While Ljungstrom does not disclose the presence of hydrogen in the coal heating production effluent, Tsai et al (col. 5, line 52 – col. 6, line 15) clearly discloses that gasification/volatilization products resulting from heating and/or gasifying a coal formation include hydrogen.

Accordingly, it is deemed that the volatilized/gasified coal production effluent produced in the process of Ljungstrom will obviously include a hydrogen component, as taught by Tsai et al, with the precise amount of hydrogen present, as called for in claims 2216, 2220, 2255, 2259, 5150, 5191, 5194, deemed an obvious expedient or matter of choice to one of ordinary skill in the art to which the invention pertains, based on, e.g., the actual intended use of the production

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effluent, such as a feed stream to a synthetic natural gas production facility or as process heat gas, as called for in claims.

As per claim 2221, 2260, it would have further been an obvious expedient or matter of choice to monitor the production effluent of Ljungstrom for hydrogen content, especially since Ljungstrom makes specific reference to controlling the process based on, inter alia, "the products desired" (col. 2, lines 42-44).

9. Claims 2216, 2220, 2221, 2223, 2224, 2256, 2259, 2260, 2262, 2263, 5150-5174, 5191, 5194 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claim 2193 above, and further in view of Justheim (3,766,982) (applied above).

Justheim'982 injects hydrogen into the heated coal formation to hydrogenate the volatilized/pyrolyzed hydrocarbons evolved; and the hydrogen provided may further be obtained from production fluids obtained from the coal formation (col. 3, lines 1-9).

Accordingly, it would have been obvious to one of ordinary skill in the art to which the invention pertains, to similarly inject hydrogen into the heated coal formation in the process of Ljungstrom, e.g., in the vicinity of the recovery wellbores, and provide the hydrogen from the production effluent, as taught by Justheim, in order to effect a partial hydroconversion/hydrotreating of the volatilized, pyrolyzed and/or gasified hydrocarbons prior to production in order to render the production effluent more suitable for further refining or above-ground processing/conversion, as called for in claims 2223, 2224, 2262, 2263, 5171.

As per claims 2216, 2220, 2256, 2259, 5150, 5191, 5194, in carrying out the injection of hydrogen into the coal formation to effect hydrogenation of the volatilized/pyrolyzed hydrocarbons evolved, in the modified process of Ljungstrom, the production fluids actually

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produced will necessarily or obviously include a partial pressure of hydrogen, with the precise amount thereof deemed an obvious matter of choice or design, based on, e.g., the particular coal formation encountered.

As per claim 2221, 2260, insofar as Justheim strives to control the amount of hydrogen present throughout the process to minimize “danger of accidental explosions”, it would have been an obvious expedient or matter of choice to monitor the partial pressure of hydrogen at the production well(s) using conventional or commercially-available monitoring means, in carrying out the overall process of Ljungstrom, as modified by Justheim.

10. Claims 2225, 2264 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) in view of Justheim (3,766,982) as applied to claim 2223 above, and further in view of Hoekstra et al (4,353,418) or Garrett (3,661,423).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to further hydrogenate the partially-hydrogenated hydrocarbons produced from the heating process of Ljungstrom, as modified by Justheim’982, with hydrogen circulated or produced by the heating process of Justheim, as taught by Hoekstra et al (note the Abstract and figure) or Garrett (col. 4, lines 50-54), in order to improve the overall quality or advance the refining/processing of the volatilized, pyrolyzed and/or gasified hydrocarbon fluids produced by the process of Ljungstrom, as modified by Justheim’982, by fully or completing hydroconverting/hydrogenating refinement process.

11. Claims 2230, 2231, 2268, 2269, 5087 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ljungstrom (2,923,535) as applied to claim 2193 above, and further in view of Salomonsson (2,914,309) or Camacho et al (4,067,390).

It would have been obvious to one of ordinary skill in the art to which the invention pertains to carry out the multiple well heating embodiment of Ljungstrom (Figures 2-5 and 9) by providing or laying out the wells in a triangle, and/or repeating triangle pattern, as disclosed by Salomonsson (note Figure 3 and col. 3, lines 5-34) or Camacho et al (note Figure 8) in order to enhance the overall heating/pyrolysis effected by optimizing well location.

12. Claims 5081, 5084, 5086, 5087, 5090 and 5209-5211 are rejected under 35 U.S.C. 103(a) as being unpatentable over Justheim (3,237,689) in view of Justheim (3,766,982).

Justheim'689 heats a deposit or formation of "solid carbonaceous material" by circulation of heating medium through one or more heater wellbores, as called for in claim 5086, and wherein such heater wellbore comprise a heater positioned in an open wellbore, as illustrated in Figure 3 and recited in claim 5212. Such heating further effects "rapid distillation of organic components" and/or "distillation, i.e., decomposition, of the organic content of the material" (col. 1, lines 60-68) in the process of Justheim, which heating effect is deemed to inherently or obviously comprise "pyrolysis" in the affected formation zone, as called for in claims 5209-5211

Justheim'689 does not explicitly disclose heating of a coal deposit, however, Justheim'982 similarly heats a solid "hydrocarbonaceous" formation, in fact Justheim '982 (note col. 2, lines 30-57) directly refers to Justheim'689, and further indicates that such formation may include coal (note col. 3, lines 10-14).

Accordingly, it would have been obvious to one of ordinary skill in the art to which the invention pertains, to carry out the subterranean heating and hydrocarbon recovery process of Justheim'689 on a coal deposit or formation, as taught by Justheim'982, to realize even greater economic benefit and useful application of the Justheim'689 process.

With specific regard to claim 5081, it is deemed that the “rapid distillation of organic components”, “progressive shrinking and fissuring of more remote areas at a rapid rate” of the coal formation effected by the process of Justheim’689, as modified, will necessarily or obviously increase the overall permeability of the coal formation. Also, it is deemed that the solid carbonaceous deposit or coal will inherently or obviously possess an initial permeability of less than 10 millidarcy, depending on the particular formation or field encountered.

Alternatively, to choose a coal deposit of such low permeability would have been an obvious matter of choice or design, especially since the process does not require the injection of fluid directly into or through the formation. Thus, the skilled practitioner can recover hydrocarbons from formations not readily accessible to fluid injection.

As per claim 5084, the recited temperature range of 270°C – 400°C is deemed to encompass the exemplary temperature range in Justheim’689 of 200°F – 800°F with any difference therebetween deemed an obvious matter of choice or design based on, e.g., the characteristics or type of the particular coal formation encountered in the field.

As per claim 5087, since one or more of the recovery wellbores (12) may be used to also provide heat to the formation as well (col. 4, lines 72-75), the well pattern illustrated in Figure 2 of Justheim’689 could be construed wherein at least some of the heat source wellbores define “a triangular pattern”, i.e., viewing the heat source wellbores in groups of three.

As per claim 5090, it is deemed that the pressure proximate the heat source wellbore(s) (10) is necessarily or obviously of greater pressure than the recovery wellbores (12), otherwise the evolved hydrocarbons would not flow toward such recovery wellbores, as disclosed.

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13. Applicant's arguments filed with the amendment have been fully considered but they are not persuasive.

Applicant's remarks regarding the eventual comparison of allowed claims is noted, however a terminal disclaimer would still be required in order to overcome the obviousness double patenting rejection based on the "sister" application, S.N. 09/841,000, for similarly treating a hydrocarbon formation.

Applicant's arguments against Ljungstrom (2,923,535) are not deemed persuasive. In col. 2, lines 1-25, Ljungstrom clearly indicates that the electrical or first heating phase will result in "the preheated stratum becoming permeable", and makes additional reference to the stratum now being "porous", such that gaseous medium can now be "introduced to the permeable stratum desirably. Further, the hydrocarbon formation heated by the electrical heaters (22) is rendered sufficiently permeable such that the products of vaporization and pyrolysis can flow and be removed "at a zone spaced laterally from that where the combustion medium was introduced". Overall, Ljungstrom heats a "relatively impermeable" coal formation with a plurality of electrical heaters which both heat and render the formation sufficiently permeable such that an in situ combustion phase may be carried out involving oxidant or gaseous medium injection and spaced recovery of the hydrocarbon effluent. By virtue of the precise pattern of electrical heaters deployed, and noting no indication otherwise, it is deemed that the permeability effected will be uniform throughout the heated region - into which combustion supporting gaseous medium can be then be injected. With regard to the passage of Ljungstrom which applicant argues suggests that uniform permeability is not provided, it is noted that in this example all the wells are shut-in and the flow of pyrolysis products are diverted "towards the

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surroundings is all directions” with the pressure drop measurements indicating different permeability taken around or outside of the zone (col. 5, lines 29-68). There is no indication that the coal region or zone which is directly effected by the heating will experience any difference in permeability increase. Instead the wells within the heated region are all shut-in to force the pyrolysis and/or vaporized fluids to flow out into the unheated or unaffected regions wherein the variations in permeability and porosity are observed.

Further in this regard, it is noted that applicant invites the examiner to provide a reference(s) or affidavit to support myriad assertions in the rejection as per MPEP 2144.03. It is not seen that such section of the MPEP was invoked. Instead, it is deemed that MPEP Sections 2144.02, and particularly Section 2144.05, are more “relied upon”. However, it has been observed that one of the references cited of record to Ware et al (4,691,771), in their discussion of the prior art or state of the art (col. lines 30-40), observe that formations of less than 100 millidarcy are normally characterized or deemed in the art as being of “low permeability” such that fluids, such as steam or a combustion-supported gaseous medium could not be injected without incurring unacceptably high injection pressures and unwanted or uncontrolled fracturing of the formation with resulting fluid bypass occurring. Since, however, Ljungstrom, as noted above, discloses that the formation is rendered sufficiently permeable by the electrical heating phase to then allow the subsequent in situ combustion phase to be successfully carried out, it must, i.e., inherently, possess a permeability “greater than 100 millidarcy”, as defined by the state of the art observation of Ware et al. Similarly, the initial characterization of the unheated coal formation as “relatively impermeable” would appear to encompass the initial permeability in claim 5081 of “less than 10 millidarcy”, which is clearly less than 100 millidarcy. Also, in

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view of the noted disclosure of Ljungstrom, the burden appears to now fall on applicant, as per MPEP Section 2144.05, to indicate how the said ranges of “less than 10 millidarcy” and/or “greater than 100 millidarcy” patentably distinguishes over Ljungstrom under 35 USC 103, e.g., by some showing of criticality or unexpected results.

With respect to claims 2202, 2241, Ljungstrom discloses controlling or maintaining the temperature within a specific operating range (col. 2, lines 25-48); it would have been an obvious expedient to effect such temperature control, at least in part by controlling the heating rate to the level recited. The formula depicted in these claims appears to comprise a common power relationship based on major formation characteristics with no criticality or unexpected results observed for the recited average heating rate of 10oC/day. Ljungstrom also indicates that some pyrolysis may occur during the electrical heating phase (col. 4, lines 21-35).

Contrary to applicant’s arguments regarding the thermal heat conductivity imparted by claims 2204, 2243, 5156 and 5181, it is deemed one skilled in the art would expect adequate heat conductivity and thermal diffusivity would occur in the process of Ljungstrom which is based in large part on heat transfer both into the formation from the heaters, and subsequently from such heated formation section to adjacent formation interval, as disclosed as the expansion of heated formation to the outlines (32) and (42) illustrated in Figures 2-5. Accordingly, the recited thermal conductivity would inherently or obviously occur in Ljungstrom since the formation appears heated in the same manner, and for the same purpose, as per applicant’s claimed invention.

Contrary to applicant’s arguments 2222, 2228, 2261, 2266, 5193, 5195, 5197, Ljungstrom makes repeated and frequent references to controlling the temperature, controlling

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the pressure, maintaining a temperature range (note col. 2, lines 25-48 and the example in cols 4-5). Moreover, it is not seen where applicant provides any evidence of unexpected and/or improved results based on the steps or limitations of these claims

With specific respect to claims 2222, 2261, and 5195, it is deemed that Ljungstrom both alters or controls the pressure and avoids the production of hydrocarbons having carbon numbers greater than 25. In this regard, it is known, as per petroleum or organic chemistry, that such hydrocarbons comprise wax component. Since Ljungstrom (note col. 2, lines 25-48) makes frequent reference to “valuable products” and “desirable products of oil vaporization and pyrolysis”, and recovers the hydrocarbon effluent in the vapor phase, it is deemed that Ljungstrom inherently or obviously also inhibits or avoids the production of hydrocarbons having carbon numbers greater than 25.

With respect to claims 2228, 2266 and 5195, insofar as the coal formation is heated through at least two operational phases, as noted above, along with a specific well pattern(s) to ensure complete exploitation of the formation, it is deemed that applicant’s recited conversion/recovery extent of 60% by weight of condensable hydrocarbons, as measured by the Fischer Assay, will inherently or obviously be effected by the Ljungstrom process.

Regarding applicant’s arguments against claims 2229, 2267, 5396-5200 and 5218, it is noted that Ljungstrom is not limited to the use of 6 heaters per production well, but merely sets forth such well arrangement as an example: “Electrical heating elements 22 may be arranged ... in groups comprising six elements about a common gas exhaust passage 26”. Contrary to applicant’s arguments, it is not seen where applicant discloses that the use 7 or more heaters provides any unexpected results over Ljungstrom, and it is deemed that one skilled in the well art

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would similarly be concerned with “desired product composition ... production rates, desired heating rates” in order to optimize or tailor the Ljungstrom process to a particular coal formation. In fact, Ljungstrom, as noted previously, is specifically directed to recovery of “valuable products”.

With respect to the combination of Ljungstrom and Tsai et al (4,299,285), as applied to claim 2216+, it is not seen that any particular error in such combination has been pointed out by applicant.

Similarly, no particular argument or error in the combination of Ljungstrom with Justheim et al (3,766,982), Hoekstra et al (4,353,418) and/or Garrett (3,661,423) has been pointed out by applicant.

With respect to the combination of Ljungstrom and Salomonasson (2,914,309) or Camacho et al (4,067,390), it is noted again that the well arrangement illustrated in Ljungstrom is exemplary only. Hence, one skilled in the art is not deemed precluded from deploying the well known and conventional well pattern arrangements of Salomonasson or Camacho et al, based on, e.g., routine experimentation or formation characteristics and extent, as actually encountered in the field.

Applicant's arguments against Justheim (3,237,689) are not deemed persuasive. Again, applicant's reference(s) to MPEP Section 2144.03 is not deemed persuasive. Applicant is instead referred to MPEP Sections 2144.02 and particularly Section 2144.05, i.e., since Justheim'689 operates in the same manner as per applicant's invention, similar results will ensue, and “where the general conditions of a claim are disclosed ... it is not inventive to discover optimum or workable ranges by routine experimentation”. The reference in

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Justheim'689 to "solid carbonaceous materials in situ" (col. 1, lines 54-60) is deemed clearly indicative of a low initial permeability; applicant has not demonstrated any criticality or unexpected results based on the coal formation possessing an initial permeability of less than 10 millidarcy.

With respect to claim 5084, the recited temperature range of "about 270oC to about 400oC" overlaps or is encompassed by the exemplary temperature in Justheim'689 of "200o to 800oF" with no criticality or unexpected results observed for any difference therebetween.

Regarding applicant's arguments in support of claim 5086, Justheim'689 clearly circulated a hot fluid through a conduit (17) positioned in a wellbore, as illustrated in Figure 3.

As noted in the rejection regarding claim 5087, since one or more of the recovery wellbores (12) may be used to also provide heat to the formation as well (col. 4, lines 72-75), the well pattern illustrated in Figure 2 of Justheim'689 could be construed wherein at least some of the heat source wellbores define "a triangular pattern", i.e., viewing the heat source wellbores in groups of three. With respect to claim 5090, it is deemed that the pressure proximate the heat source wellbore(s) (10) is necessarily or obviously of greater pressure than the recovery wellbores (12), otherwise the evolved hydrocarbons would not flow toward such recovery wellbores, as disclosed.

14. It is noted that claims 2199, 2201, 2219, 2238, 2240, 2258, 5088, 5089, 5179 and 5193 have been rejected only on the grounds of double patenting and/or 35 USC 112(2).

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Suchfield whose telephone number is 703-308-2152. The examiner can normally be reached on M-F (6:30 - 3:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bagnell can be reached on 703-308-2151. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7687 for regular communications and 703-305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.


George Suchfield
Primary Examiner
Art Unit 3672

gs
December 30, 2002